

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A scanning optical apparatus comprising:
incident optical means for causing at least one light beam emitted from light source means to be incident on deflection means; and
image formation means including at least one refractive optical element and at least one diffraction optical element for imaging said the at least one light beam reflected and deflected by the deflection means on a surface to be scanned,
wherein among the elements included in said image formation means, the diffraction optical element is closest to the surface to be scanned and has at least one of an incident surface having a convex shape in a sub-scanning cross-section facing the deflection means and an exit surface having a convex shape in the sub-scanning cross-section facing the surface to be scanned, and
wherein a diffraction grating is formed on one of the incident surface and the exit surface of the diffraction optical element.
2. (Canceled)
3. (Currently Amended) An apparatus according to Claim 1, wherein said image formation means comprises a single refractive optical element and a single diffraction optical element and satisfies:

$0.5 < |e_2/s_1|$

where e_2 is a distance between an exit surface of the refractive optical element on an optical axis and the incident surface of the diffraction optical element on the optical axis, and

s_1 is a distance between the incident surface of the diffraction optical element on the optical axis and a front focus position of the diffraction optical element in the sub-scanning cross-section.

4. (Original) An apparatus according to Claim 1, wherein the refractive optical element has a meniscus shape in a main scanning cross-section such that a concave surface faces the deflection means.

5. (Currently Amended) An apparatus according to Claim 1, wherein a front focus position of the diffraction optical element in the sub-scanning cross-section is provided between a power arrangement in the sub-scanning cross-section of an on-axis of the refractive optical element and a power arrangement in the sub-scanning cross-section of an off-axis of the refractive optical element, in an optical axis direction.

6. (Currently Amended) An apparatus according to Claim 1 further comprising[[::]] at least one of tilt adjusting means and shift adjusting means for adjusting a position of said the diffraction optical element.

7. (Currently Amended) An image forming apparatus comprising:

a scanning optical apparatus according to ~~any one of Claims 1 to 6~~ Claim 1;

a photosensitive member arranged on the surface to be scanned;

a developing member for developing an electrostatic latent image formed on the said photosensitive member by the light beam scanned by said scanning optical apparatus as a toner image;

a transfer member for transferring the developed toner image onto a material to be transferred;

a fixing member for fixing the transferred toner image on the material to be transferred; and

a printer controller for converting code data inputted from an external device into an image signal and inputs the image signal into said scanning optical apparatus.

8. (Currently Amended) An image forming apparatus comprising:

a plurality of scanning optical apparatuses according to ~~any one of Claims 1 to 6~~ Claim 1,

wherein a color image is formed by guiding a plurality of light beams emitted from the respective scanning optical apparatuses onto a plurality of corresponding image bearing member surfaces, respectively, and scanning the plurality of image bearing member surfaces with the plurality of light beams.

9. (Currently Amended) A scanning optical apparatus comprising:
~~incident optical means for causing at least one light beam emitted from light source means to be incident on deflection means; and~~
~~image formation means including at least one refractive optical element and at least one diffraction optical element for imaging said at least one light beam reflected and deflected by the deflection means on a surface to be scanned; according to Claim 1,~~
wherein the following condition is satisfied:

$$0.5 < |e2/s1| < 1.2$$

where $e2$ represents a distance between an exit surface of the refractive optical element on an optical axis and an incident surface of the diffraction optical element on the optical axis, and

$s1$ represents a distance between the incident surface of the diffraction optical element on the optical axis and a front focus position of the diffraction optical element in a sub-scanning cross-section.

10 to 14. (Canceled)

15. (Original) An apparatus according to Claim 9, wherein the following condition is satisfied:

$$0.55 < |e2/s1| < 1.1.$$

16 to 17. Canceled

18. (New) An apparatus according to Claim 1, wherein when the diffraction grating is formed on the incident surface, the exit surface has a convex shape in the sub-scanning cross-section facing the surface to be scanned, and when the diffraction grating is formed on the exit surface, the incident surface has a convex shape in the sub-scanning cross-section facing the deflection means.

19. (New) An apparatus according to Claim 1, wherein a plurality of light beams are emitted from the light source means.